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**United States Patent 6301575**

## Using object relational extensions for mining association rules

US Patent Issued on October 9, 2001

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### Application

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[707/2](#)

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[707/2](#), [707/3](#), [707/6](#)

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### US Patent References

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[5724573](#)  
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### Abstract

A method, apparatus, and article of manufacture for computer-implemented use of object relational extensions for mining association rules. Data mining is performed by a computer to retrieve data from a data store stored on a data storage device coupled to the computer. A multi-column data store organized using a multi-column data model is received. One of the columns in the multi-column data store represents a transaction, and each of the remaining columns in the multi-column data store represents elements of that transaction. A combination operator is performed to obtain candidate itemsets of data from the multi-column data store, each itemset being a combination of a number of rows of the multi-column data store. Large itemsets of data are generated from the candidate itemsets, wherein each itemset has at least a

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Patent No. 6,718,554

*Hands free towel carrying system*

A hands free towel carrying system for coupling a towel to a user to prevent loss, theft or contamination.

[5943667](#) minimum support. Association rules are generated from  
[5983222](#) the large itemsets of data, wherein each association rule  
[6032146](#) has at least a minimum confidence.  
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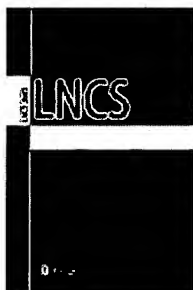
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**Book Chapter**

# An Object-Relational Approach to the Representation of Multi- granular Spatio-Temporal Data

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**Abstract**

The notion of spatio-temporal multi-granularity is fundamental when modeling objects in GIS applications in that it supports the representation of the temporal evolutions of these objects. Concepts and issues in multi-granular spatio-temporal representations have been widely investigated by the research community. However, despite the large number of theoretical investigations, no comprehensive approaches, have been proposed dealing with the representation of multi-granular spatio-temporal objects in commercially available DBMSs. The goal of the work that we report in this paper is to address this gap. To achieve it, the paper first introduces an object-relational model based on

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OpenGis specifications described in SQL3. Several extensions are developed in order to improve the semantics and behavior for spatio-temporal data types introducing an approach to represent the temporal dimension in this model and the multi-representation of spatio-temporal granularities.

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K. Kulkarni. *Object-oriented extensions in SQL3: A status report*. ACM SIGMOD Conf., Minneapolis, 1994.

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This paper is cited in the following contexts:

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Performance Tradeoffs for Client-Server Query Processing - Franklin, Jónsson, ... (1996) (29 citations) (Correct)

...by NSF Grant IRI 94 09575, an IBM SUR award, and a grant from Bellcore. Bjorn Jonsson was supported in part by a Fulbright Fellowship. Donald Kossmann was supported in part by the Humboldt Stiftung. **towards integrating object oriented features into their systems (e.g. the emerging SQL3 standard [Kul94] while vendors of object oriented systems are adding more powerful query facilities [Cat94] Furthermore, a new class of hybrid ObjectRelational systems has recently started to appear (e.g. Illustra and UniSQL) These efforts have resulted in significant progress towards integrating object ....**

K. Kulkarni. *Object-oriented extensions in SQL3: A status report*. ACM SIGMOD Conf., Minneapolis, 1994.

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Database Object Creation Subject to Constraint Rules Using a.. - Embury, Gray (1995) (Correct)

...manipulation language is Daplex, a functional style declarative language, which contains a rich set of constructs for describing filtering predicates on database classes and navigation via relationships. **Interestingly, high level query languages for Object oriented database system, such as SQL3 [18], are coming more and more to resemble Daplex.** In our implementation, Daplex programs are compiled into Prolog clauses, which contain embedded calls to the database access primitives. A recent extension to the language allows users to state semantic integrity constraints in Daplex, which are then ....

K.G. Kulkarni. *Object-Oriented Extensions in SQL3: a Status Report*. In R.T. Snodgrass and M. Winslett, editors, SIGMOD 94 Conference, page 478, Minneapolis, USA, May 1994. ACM Press.

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Integrating Association Rule Mining with Relational Database.. - Sarawagi (1998) (46 citations) (Correct)

...mining in a DBMS cal language. A preprocessor will generate appropriate SQL translation for this operation. **We consider translations that can be executed on a SQL 92 [16] relational engine, as well as translations that require some of the newer object relational capabilities being designed for SQL [15].** Specifically, we assume availability of blobs, user defined functions, and table functions [19] We compare the performance of the above SQL architecture with the following alternatives: Read directly from DBMS: Data is read tuple by tuple from the DBMS to the mining kernel using a cursor ....

K. Kulkarni. *Object oriented extensions in SQL3: a status report*. Sigmod record, 1994.

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Towards a Scalable Parallel Object Database - The Bulk.. - Sujithan (1996) (3 citations) (Correct)

...language standard being developed by both ANSI and ISO committees together for the last three years, aims to address this requirement. **SQL3 is upward compatible with, and extends SQL 92, in many significant ways, one of the major extensions being the addition of an extensible object data model [13, 86].** This work is still evolving, with much work still need to be done. On the other hand, the Object Database Management Group (ODMG) as part of the OMG Organisation (an industrial consortium established to promote object technology) has proposed an industry standard for object databases [33] The ....

K. G. Kulkarni. *Object-oriented extensions in SQL3: A status report*. In R. T. Snodgrass and M. Winslett, editors, Proceedings of the International Conference on Management of Data, pages 478--478. ACM Press, May 1994.

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A Study of Query Execution Strategies for Client-Server.. - Kossmann, Franklin (1996) (4 citations) (Correct)

...are likely to gain acceptance across a larger range of applications [S 90] System builders have been approaching this perceived need in several ways. **Vendors of relational systems are moving towards integrating object oriented features into their systems (e.g. the emerging SQL3 standard [Kul94] and vendors of object oriented systems are adding more powerful query facilities [Cat94] This work was partially supported by NSF Grant IRI 94 09575.** Donald Kossmann was supported by the Humboldt Stiftung. Furthermore, a new class of hybrid Object Relational systems has recently started ....

K. G. Kulkarni. *Object-oriented extensions in SQL3: A status report*. In Proc. of the ACM SIGMOD Conf. on Management of Data, page 478, Minneapolis, MI, USA, May 1994.

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